

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A composition comprising a polysaccharide starch particle and a cationic polyquaternary amine additive, wherein the cationic polyquaternary amine additive is adhered to the polysaccharide starch particle to provide a polysaccharide starch particle having a stable positive surface charge, and wherein the cationic polyquaternary amine has a molecular weight in the range from about 1 million to about 5 million grams per mole.

2-4. (Cancelled)

5. (Currently amended) The composition of Claim 3 1 wherein the polyquaternary amine has about 3 meq quaternary amine per gram.

6. (Original) The composition of Claim 1 wherein the cationic additive is present in the composition in an amount from about 1 to about 15 pounds per ton polysaccharide.

7. (Original) The composition of Claim 1 wherein the surface charge is in the range from about +1 mV to about +100 mV.

8. (Currently Amended) The composition of Claim 1 wherein the polysaccharide starch is selected from the group consisting of corn, potato, tapioca, pea, and wheat starches.

9. (Currently amended) A pulp furnish comprising a polysaccharide starch particle having a stable positive surface charge, wherein the polysaccharide starch particle having a stable positive surface charge comprises a cationic polyquaternary amine additive adhered to the polysaccharide starch particle, and wherein the cationic polyquaternary amine additive has a molecular weight in the range from about 1 million to about 5 million grams per mole.

10-11. (Cancel)

12. (Currently amended) The furnish of Claim 9 wherein the polysaccharide starch particle has a surface charge in the range from about +1 mV to about +100 mV.

13. (Original) The furnish of Claim 9 further comprising an anionic retention aid.

14. (Original) The furnish of Claim 9 further comprising a cationic retention aid.

15. (Original) The furnish of Claim 13 further comprising a cationic retention aid.
16. (Original) The furnish of Claim 13 wherein the anionic retention aid comprises an anionic polyacrylamide.
17. (Original) The furnish of Claim 16 wherein the anionic polyacrylamide comprises a copolymer of acrylic acid and acrylamide.
18. (Original) The furnish of Claim 17 wherein the copolymer comprises about 30 mole percent acrylic acid and about 70 mole percent acrylamide.
19. (Original) The furnish of Claim 17 wherein the copolymer has a molecular weight in the range from about 8 to about 15 million grams per mole.
20. (Original) The furnish of Claim 13 wherein the anionic retention aid is present in the furnish in an amount from about 0.1 to about 3.0 pounds per ton fiber.
21. (Original) The furnish of Claim 14 wherein the cationic retention aid comprises a cationic polyacrylamide.
22. (Original) The furnish of Claim 21 wherein the cationic polyacrylamide comprises a copolymer of acrylamide and a quaternary amine monomer.
23. (Original) The furnish of Claim 22 wherein the copolymer comprises about 90 mole percent acrylamide and about 10 mole percent quaternary amine monomer.
24. (Original) The furnish of Claim 22 wherein the copolymer has a molecular weight in the range from about 8 to about 15 million grams per mole.
25. (Original) The furnish of Claim 14 wherein the cationic retention aid is present in the furnish in an amount from about 0.1 to about 12 pounds per ton fiber.
26. (Currently amended) A paper product comprising a polysaccharide starch particle having a stable positive surface charge, wherein the polysaccharide starch particle having a stable positive surface charge comprises a cationic polyquaternary amine additive adhered to the

polysaccharide starch particle, and wherein the cationic polyquaternary amine additive has a molecular weight in the range from about 1 million to about 5 million grams per mole.

27-28. (Canceled)

29. (Currently amended) The paper product of Claim 26 wherein the polysaccharide starch particle has a surface charge in the range from about +1 mV to about +100 mV.

30. (Original) The paper product of Claim 26 further comprising an anionic retention aid.

31. (Original) The paper product of Claim 26 further comprising a cationic retention aid.

32. (Original) The paper product of Claim 30 further comprising a cationic retention aid.

33. (Original) The paper product of Claim 30 wherein the anionic retention aid comprises an anionic polyacrylamide.

34. (Original) The paper product of Claim 31 wherein the cationic retention aid comprises a cationic polyacrylamide.

35. (Original) The paper product of Claim 26 wherein the paper product is selected from the group consisting of fine paper, newsprint, bleached board, liner board, medium board, and old corrugated cardboard.

36-55. (Canceled)

56. (Currently amended) A method for forming a polysaccharide starch particle having a stable positive surface charge, comprising:

(a) combining a cationic polyquaternary amine additive having a molecular weight in the range from about 1 million to about 5 million grams per mole and a slurry of a polysaccharide starch particle in water at about pH 10; and

(b) adjusting the pH to about pH 7.

57. (Currently amended) A method for forming a polysaccharide starch particle having a stable positive surface charge, comprising combining a polysaccharide starch particle and a cationic polyquaternary amine additive having a molecular weight in the range from about 1 million to about 5 million grams per mole in water at about pH 7.

58. (Currently amended) A method of making a paper product having uniformly distributed modified starch particles therein, comprising:

(a) forming an aqueous slurry of uncooked starch particles;

(b) adding a cationic polyquaternary amine additive to said aqueous slurry of uncooked starch particles, the cationic polyquaternary amine additive having a molecular weight in the range from about 1 million to about 5 million grams per mole, wherein the cationic polyquaternary amine additive adheres to the starch particles, thereby forming modified starch particles having a stable positive surface charge in the range of about +1 mV to +100 mV as determined by the zeta potential measurement;

(c) adding the modified starch particles to a pulp furnish;

(d) mixing said pulp furnish to uniformly distribute said modified starch particles in said furnish;

(e) depositing said pulp furnish onto a foraminous support to provide a wet web having the modified starch particles uniformly distributed therein; and

(f) dewatering and drying the wet web to provide a paper product having the modified starch particles uniformly distributed therein.

59-60. (Canceled)

61. (Previously added) The method of Claim 58, wherein the cationic additive is added in the amount of about 1 to 15 pounds per ton of starch.

62. (Previously added) The method of Claim 58, wherein the modified starch particles are added in the amount of about 0.5 to 20 percent by weight of the pulp furnish.

63. (Previously added) The method of Claim 58, wherein the paper product has at least about 60% retention of the modified starch particles.

64. (Previously added) The method of Claim 58, further comprising adding an anionic retention aid to said pulp furnish.

65. (Previously added) The method of Claim 58, further comprising adding a cationic retention aid to said pulp furnish.

66. (Previously added) The method of Claim 64, wherein said anionic retention aid comprises an anionic polyacrylamide.

67. (Previously added) The method of Claim 65, wherein said cationic retention aid comprises a cationic polyacrylamide.

68. (Previously added) The method of Claim 58, wherein the paper product is selected from the group consisting of fine paper, newsprint, bleached board, liner board, medium board, and old corrugated containers.

69. (Previously added) The product produced by the process of claim 58.